

For this reason, it is respectfully submitted that the panel structure of Figs. 1a, 1b as well as the device of Fig. 1c are NOT prior art. Rather they illustrate an embodiment of applicants' invention, accordingly it is respectfully submitted that the rejection under 35 U.S.C. § 103 (a) should be withdrawn. It is noted that the earlier filed amendments to the specification and drawings were intended to make it clear that such figures are not prior art.

Claim 16 – Is already in independent form

Claim 16 was objected to as being dependent upon a rejected base claim. It is respectfully submitted that claim 16 as it is currently pending (based on the amendment A mailed on April 15, 2002) is written in independent form and that it does not depend from any rejected base claim. Accordingly, it is respectfully submitted that the claim as now pending should be allowed.

Claims 13-15 and 17-44 – Lin does not disclose a lead frame

The Examiner has rejected claims 13-15 and 17-44 under 35 U.S.C. §102(b) as anticipated by Lin et al., U.S. Patent No. 5,273,938 (Lin). These rejections are respectfully traversed. Initially, it is pointed out that Lin contemplates the adhesion of a conductive **foil** or the deposition of a conductor material onto a flexible “transfer film”. See the paragraph beginning on at Col. 2, lines 33 of the Lin patent. In contrast, each of the claims specifically require the use of a **lead frame**. Although lead frames are formed from relatively thin sheets of metal (e.g., copper), they are NOT foils. It is respectfully submitted that the significant distinctions between foil based technologies discussed by Lin and lead frame technology of the present invention are widely understood to those skilled in the art and that such people would understand the term lead frame to exclude metal foils such as the foil (or the deposited conductive layers). In view of the foregoing, it is respectfully submitted that the pending claims are not in any way anticipated by Lin for at least this reason and that accordingly, the pending rejection should be withdrawn.

In the previously filed amendment, a number of additional distinctions were pointed out that are respectfully submitted to patentably distinguish to the various claimed invention. Many of these are repeated below.

Claims 18 – Lin does not disclose a 2-D array of device areas separated only by tie bars

Claim 18 is directed at a lead frame panel suitable for use in semiconductor packaging and requires a matrix of tie bars that extend in substantially perpendicular rows and columns to define a two dimensional array of immediately adjacent device areas separated only by the tie bars, each device area being suitable for use in an independent integrated circuit package. Nothing in Lin suggests such a two dimensional array. Rather, as illustrated in Fig. 9, Lin has a one-dimensional strip of device areas. Accordingly, it is respectfully submitted that claim 18 is not anticipated by Lin for at least this reason as well.

Claims 26 – Lin does not disclose a cap that covers a 2-D array of device areas

Claim 26 is directed at a panel assembly suitable for use in packaging a 2-D array of integrated circuits simultaneously. The panel assembly includes a lead frame panel patterned to define at least one two dimensional array of adjacent device areas that are each suitable for use as part of an independent integrated circuit package. Again, Lin does not disclose or reasonably suggest a two dimensional array of device areas. Claim 26 also requires a molded cap that substantially uniformly covers the array of device areas while leaving bottom surfaces of the conductive contacts exposed to facilitate electrical connection to external components, wherein encapsulation material that forms the molded cap is exposed at a bottom surface of the panel of integrated circuits to physically isolate the contacts. Again, it is respectfully submitted that this structure is not disclosed or reasonably suggested by Lin.

Claims 34 & 36 – Lin's package does not have perpendicular side walls w/ sharp corners

Claims 34 and 36 are directed at the finished products. These claims specifically require that the plastic encapsulation have a rectangular footprint with side walls that are substantially perpendicular to a bottom surface of the integrated circuit package. They also require that the side walls of the plastic encapsulation form sharp corners where they meet. It is acknowledged that these claims recite a structure that at first glance appears to read very closely on the structure illustrated in Fig. 1 of Lin. However, it is respectfully submitted that Figure 1 is a diagrammatic illustration of the structure rather than the actual geometry of the structure. Specifically, at col. 3, line 57 – col. 4, line 8, Lin describes that the package body 20 is formed by injection molding, transfer molding or glob topping processes. It is respectfully submitted that in order to accomplish injection or transfer molding, the edges of the molds must be tapered somewhat and the corners of the mold must be slightly rounded (as opposed to sharp). Otherwise, it is not practical to withdraw the molded components from the mold. This feature of molding is well

known in the industry and it is common to diagrammatically represent devices as rectangular structures when in fact they do not have truly perpendicular side walls. It is also common to diagrammatically represent devices as having sharp corners, when they do not. In contrast, the claimed devices, which were formed by sawing, do truly have substantially perpendicular side walls and do truly have very sharp corners. In view of the foregoing, it is respectfully submitted that claims 34 and 36, as presently presented are patentable over the Lin reference.

Claims 38 – Lin does not disclose a cap that covers a 2-D array of device areas

Claim 38 is directed at a panel assembly suitable for use in packaging an array of integrated circuits. The panel assembly has a lead frame panel patterned to define at least one two dimensional array of adjacent device areas that are each suitable for use as part of an independent integrated circuit package. A molded cap is provided that covers the array of device areas while leaving bottom surfaces of the contacts exposed to facilitate electrical connection to external components. Again, it is respectfully submitted that such an arrangement is not disclosed or reasonably suggested by Lin.

Additional Comments

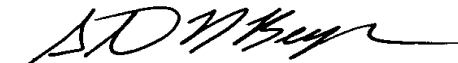
The present application describes a novel method of packaging integrated circuits. As described therein, a lead frame panel is provided which has a two dimensional array of device areas. In the packaging process, integrated circuit dice are positioned in the device areas and electrically coupled to their associated contacts. A plastic cap is then formed over the array so the cap covers a two dimensional array of device areas while leaving bottom surfaces of the contacts exposed. Thus, an array of devices are encapsulated under a single cap prior to singulation. The devices may then be singulated (typically by sawing) thereby providing a very cost effective arrangement for packaging integrated circuits. The various claims are directed at novel structures that are particularly well suited for use in the described packaging approach, or are intermediate or final components in the described packaging approach.

In contrast, the Lin reference does not describe a lead frame based process, rather Lin describes a tape based process wherein the contacts are formed by adhering a conductive foil to the tape or by a deposition based process. As is well understood by those familiar with the art, lead frames are widely used within the semiconductor packaging industry and are familiar to many within the semiconductor industry. There is also a large installed base of equipment

suitable for handling lead frames. In contrast, foil or taped based processes (which are also generally known within the industry) are generally significantly more expensive and far less widely used. The equipment used for handling tapes and foils during assembly is generally very different than the equipment used for handling lead frames. Therefore, it should be appreciated that a very significant advantage of the present invention is that the described devices can be fabricated using an inexpensive technology (i.e., lead frames) that is quite familiar to many people in the art using much of their existing equipment.

In view of the foregoing, it is respectfully submitted that all pending claims are allowable and the Applicant respectfully requests a Notice of Allowance for this application from the Examiner. If any fees are due in connection with the filing of this amendment, such fees may be charged to our Deposit Account No. 50-0388 (Order No. NSC1P217D2).

Respectfully submitted,
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